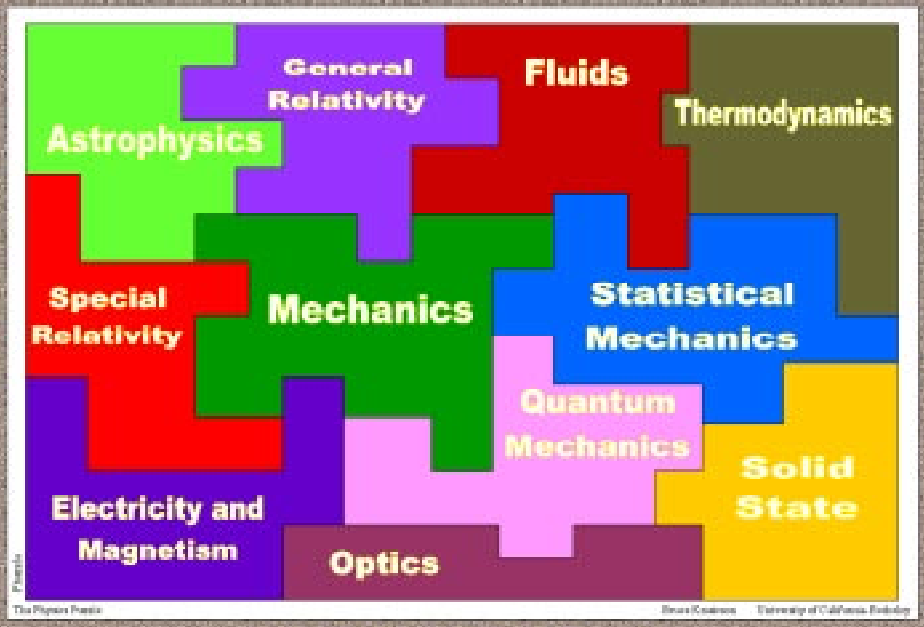
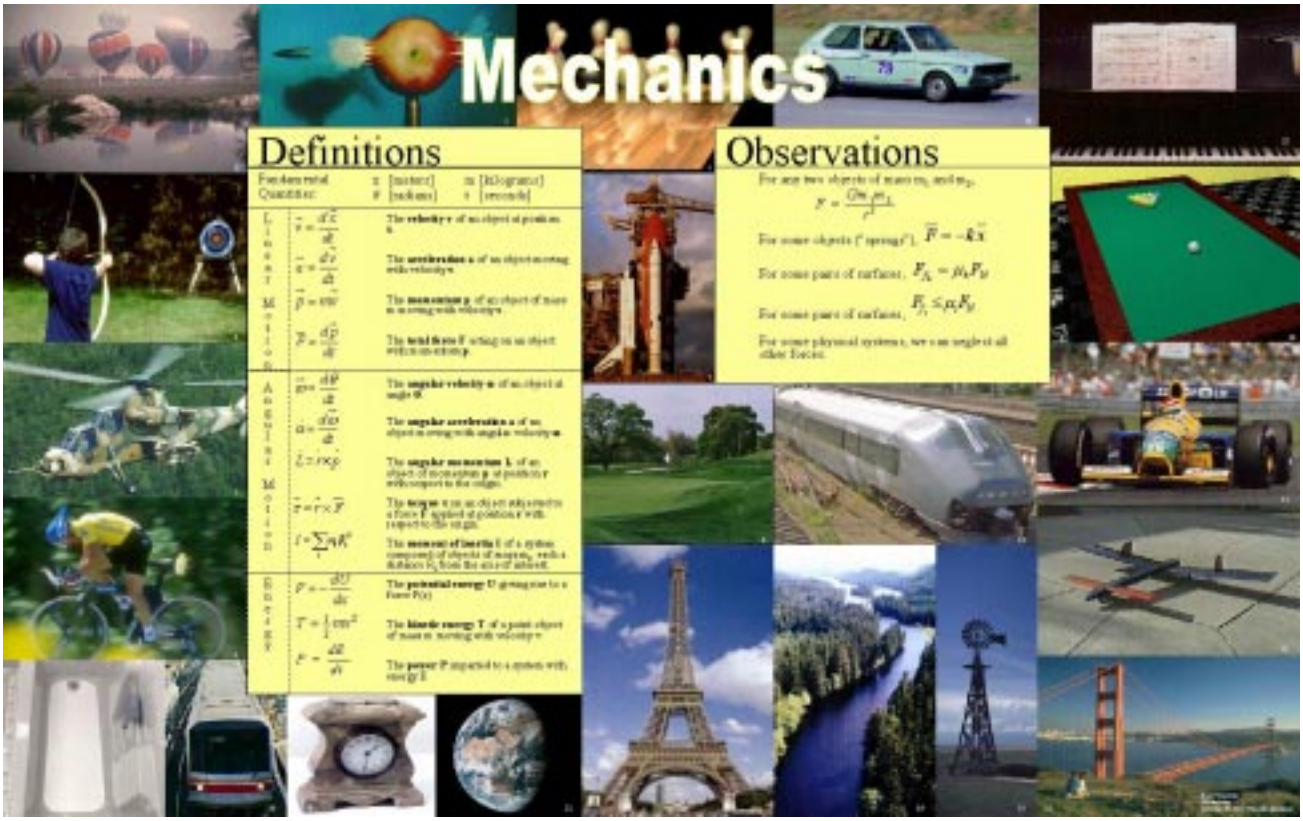
Phuzzle



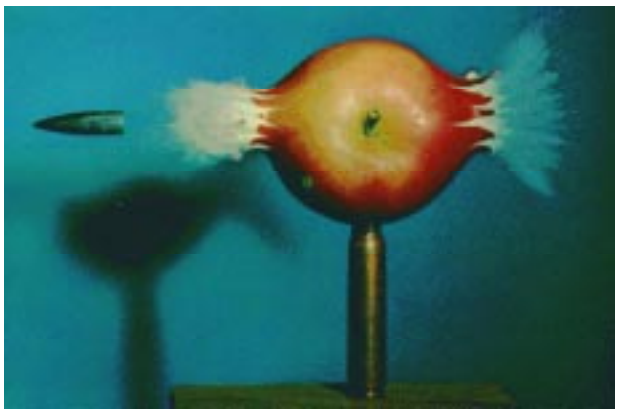
The Physics Puzzle



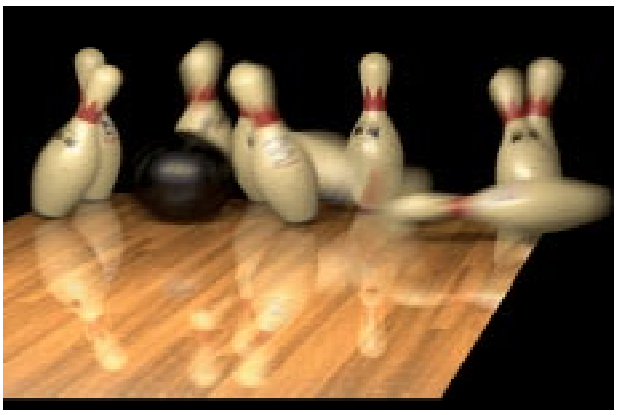
In the horizontal plane, my shot is great; in the vertical plane, my shot is lousy. Perhaps you can help me out: how far above the target should I aim?

Why are there four blades on this chopper, as opposed to (say) three or thirteen?

Bicycles are generally ‘stick shifts’, requiring the rider to manually change gears. Sketch up a design for an ‘automatic’ bicycle, which changes the gear to match the speed of the bike.



I can understand why apple explodes outwards on the left. Why does it do so on the right?



I have a great idea for a bowling lane with three gutters: the two on the sides that you normally see, and a third shallow one in the middle of the lane that channels my ball directly into the pocket. I want the third gutter to be invisible, for obvious reasons. I know that spin affects the bowling ball's path, so perhaps I could doctor the surface of the lane somehow to achieve the desired effect?

How many pounds of fuel will we need to burn in the next few minutes to get this shuttle into orbit?

I’ve never been a particularly good putter, so I am building a robot to do the job for me. I bought a device that surveys the green, giving me the height function z(x,y). I rigged up a simple automatic putter that accurately putts the ball in a specified direction and with a specified initial speed. I’m just missing the middle part: given the green z(x,y), the position of the ball, and the position of the hole, what instructions should I give my automatic putter?

As a kid I used to enjoy playing with mechanical clocks. I have occasionally argued that first semester physics courses should be entirely replaced with a “build a mechanical clock” lab, since most of the principles we learn are put to use in these relatively simple devices. The clock that I tried to design and build in sixth grade didn’t quite work, and I’m still not sure whether my design or my hardware skills were to blame. Perhaps you can do better?

The rails of a pool table are designed to make contact with the balls some distance above the table. What is this distance, and why?

I just heard in the news that a private company was attempting to launch satellites from a deck in the middle of the ocean in order to save the cost of shipping the materials to a land launch site in South America or Africa. Why might these sites be better than Cape Canaveral, and by how much?

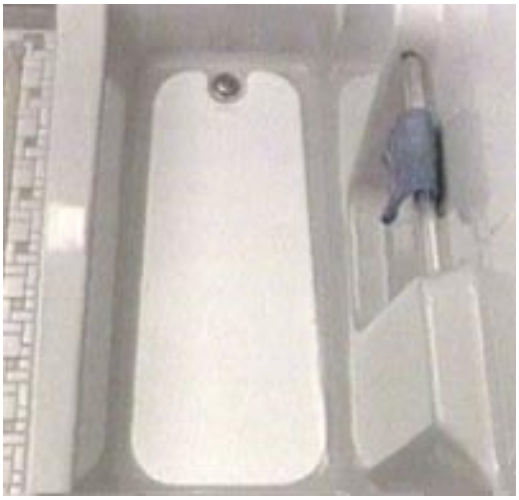
For a car to successfully navigate a bend, one wheel needs to be able to turn faster than the other. Is the problem solved in the same way for a train?

Why is this racecar so wide?

One of the problems with windmills is their high failure rate. The optimal design for a windmill in a medium to light breeze is quite different from the optimal design for a windmill in a strong gust. Is it possible design a windmill that adapts to these changing conditions?

Suspension bridges possess a certain natural beauty. Mathematically, they are pretty as well. What is the curve that describes the cable from which the suspension cables are hung?

People often complain that there just isn't enough time in a day. One way to increase the length of a day would be to build two enormous towers, roughly at the equator, at opposite ends of the earth. The increased moment of inertia would cause a corresponding decrease in the earth's angular rotation. How tall would these towers need to be in order to lengthen an earth day by one minute?

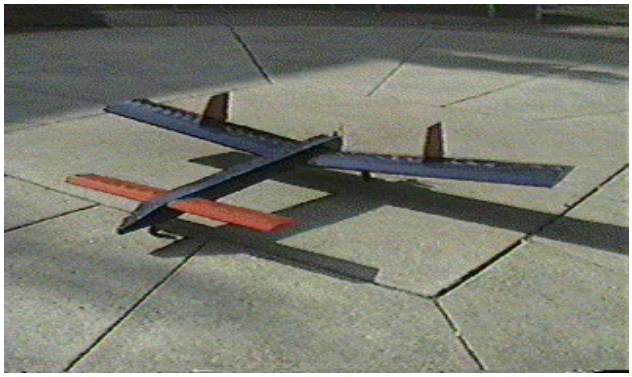


I recently got into an argument with several good physicists about whether the Coriolis force causes your bathtub to drain clockwise in the Northern Hemisphere. Does it?

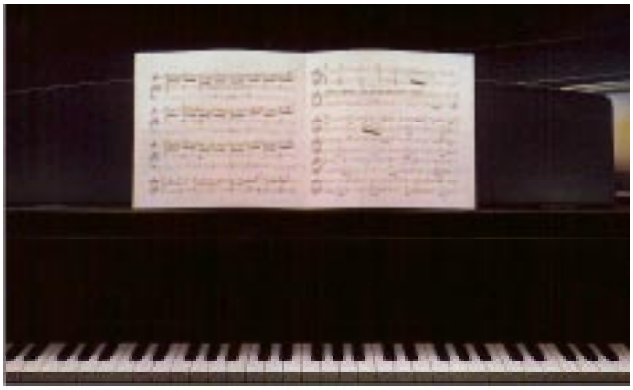
We define velocity to be the time derivative of position, and acceleration to be the time derivative of velocity. But why stop taking time derivatives? What is the physical significance of the time derivative of acceleration, and how is this quantity particularly relevant to public transportation?

Is it possible for a river to flow uphill? That is, is it possible for the mouth of a river to be farther from the center of the earth than its source?

Lots of factors influence how quickly a car can come to a complete stop: road surface, tire surface, vehicle weight and distribution, road incline, and braking mechanism are a few that come to mind. How important are each of these factors (and any others you might think of)? In "average" conditions, how long does it take you to come to a complete stop?



In order for a single engine plane to fly level, the aileron on one side of the plane must be higher than the one on the other side. Which side must be higher, and why?



With what accuracy do you need to set the tension on the high C string in order to keep it from becoming a B or a $C^{\#}$?

The summer of 1999 saw several (unsuccessful) attempts to balloon around the world. Hot air balloons can certainly cover significant distance in favorable conditions. But how *high* can a hot air balloon go?